WHAT IS CLAIMED IS:

1. A reconfigurable apparatus with a high usage rate in hardware, comprising:

at least one reconfigurable unit having a plurality of processing units and a plurality of switch boxes connected to the plurality of processing units, the at least one reconfigurable unit receiving at least one configuration signal and dynamically changing the plurality of processing units and the plurality of switch boxes according to the at least one configuration signal, thereby forming at least one functional unit.

2. The reconfigurable apparatus as claimed in claim 1, wherein the reconfigurable unit is homogeneous that has the same processing units, heterogeneous that has different processing units, or combined above.

3. The reconfigurable apparatus as claimed in claim 1, wherein the switch boxes comprise at least one interconnection to deliver data among the processing units.

4. The reconfigurable apparatus as claimed in claim 3, wherein the at least one switch box is a multiplexer or data bus.

5. The reconfigurable apparatus as claimed in claim 1, wherein the processing units respectively are processing elements (PEs) capable of independently executing computation.

6. The reconfigurable apparatus as claimed in claim 5, wherein the PEs are capable of executing at least 4-bit arithmetic or logic operation.

7. The reconfigurable apparatus as claimed in claim 5, wherein a plurality of functional units in a processor or system of the reconfigurable

apparatus have the internal circuit blocks with the same hardware components that can be the PEs.

8. The reconfigurable apparatus as claimed in claim 5, wherein the PEs respectively have different computing functions.

9. The reconfigurable apparatus as claimed in claim 7, wherein the PEs respectively have different computing functions.

10. The reconfigurable apparatus as claimed in claim 5, wherein the PEs have the same computing function.

11. The reconfigurable apparatus as claimed in claim 7, wherein the PEs have the same computing function.

12. The reconfigurable apparatus as claimed in claim 5, wherein at least one of the PEs has different computing function from other PEs.

13. The reconfigurable apparatus as claimed in claim 7, wherein at least one of the PEs has different computing function from other PEs.

14. The reconfigurable apparatus as claimed in claim 1, wherein the processing units are basic functional units.

15. The reconfigurable apparatus as claimed in claim 14, wherein the basic functional units have internal hardware components selected from one of arithmetic logic units, multipliers, multiplication and accumulation units, registers and memory.

16. The reconfigurable apparatus as claimed in claim 14, wherein the switch boxes are used to connect the internal hardware components of the different basic functional units.

17. The reconfigurable apparatus as claimed in claim 16, wherein

part of internal hardware components of one basic functional unit and part or all of internal hardware components of at least one different basic functional unit are connected to form the functional units.